
SPECIFICATIONS (FOR CONSTRUCTION OF)

SOLICITATION NO. DACA45 03-R-0051

REPLACE HYDRANT FUEL SYSTEM SGBP 050017



HQ DLA/U.S. AIR FORCE PROJECT

OFFUTT AFB, Nebraska

SECTION 02316 ATTACHMENTS

**APPENDIX A
HARDFILL 2 COMPOSITE SITE PLAN
AND BORING LOGS**

**APPENDIX B
SITE PLANS AND PLUME INFORMATION**

**APPENDIX C
CONTAMINATION INVESTIGATION REPORT**

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REPLACE HYDRANT FUEL SYSTEM
OFFUTT AFB, NEBRASKA

SECTION 02316 ATTACHEMENTS

TABLE OF CONTENTS

APPENDIX A - HARDFILL 2 COMPOSITE SITE PLAN AND BORING LOGS

SITEP	HARDFILL 2 COMPOSITE SITE PLAN
H2C-MW38D	BORING LOGS - H2C-MW38D
H2C-MW39D	BORING LOGS - H2C-MW39D
H2C-MW40D	BORING LOGS - H2C-MW40D

APPENDIX B - SITE PLANS AND PLUME INFORMATION

Fig 8-1	SITE PLAN HARDFILL 2 COMPOSITE, OFFUTT AFB, NEBRASKA
Fig 8-13	SOUTHERN PLUM TOTAL CAH ISOCONCENTRATION MAP
Fig 2-4	GEOLOGIC CROSS-SECTIONS & TOTAL CAH ISOCONCENTRATIONS HF2 COMP. SITE
Fig 1	SITE PLAN FIRE TRAINING AREA 2 (Near Apron)
HGS	HISTORICAL GROUNDWATER SAMPLING

APPENDIX C - CONTAMINATION INVESTIGATION REPORT

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APPENDIX A

HARDFILL 2 COMPOSITE SITE PLAN AND BORING LOGS

SITEP	HARDFILL 2 COMPOSITE SITE PLAN
H2C-MW38D	BORING LOGS - H2C-MW38D
H2C-MW39D	BORING LOGS - H2C-MW39D
H2C-MW40D	BORING LOGS - H2C-MW40D

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HTRW DRILLING LOG

DISTRICT

USACE Omaha District

HOLE NUMBER

H2C-MW38D

1. COMPANY NAME

URS Corporation

2. DRILLING CONTRACTOR

Coranco

SHEET

SHEETS

1 OF 5

3. PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN

4. LOCATION

Offutt AFB, Nebraska

5. NAME OF DRILLER

T. Malosek

6. MANUFACTURER'S DESIGNATION OF DRILL

Mobile B-57

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

8-1/4" HSA (OD), AW Rods, 2" Split

Spoon, 3" Split Spoon

8. HOLE LOCATION

H2C Parking Lot 30

9. SURFACE ELEVATION

970.0'

10. DATE STARTED

5/3/01

11. DATE COMPLETED

5/3/01

12. OVERBURDEN THICKNESS

N/A

15. DEPTH GROUNDWATER ENCOUNTERED

14.0

13. DEPTH DRILLED INTO ROCK

N/A

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED

6.2 @ 39 days

14. TOTAL DEPTH OF HOLE

36.0

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

N/A

18. GEOTECHNICAL SAMPLES (TESTED)

8

DISTURBED

7

UNDISTURBED

1

19. TOTAL NUMBER OF CORE BOXES

N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

None

VOC

METALS

OTHER (SPECIFY)

OTHER (SPECIFY)

OTHER (SPECIFY)

21. TOTAL CORE RECOVERY

N/A %

22. DISPOSITION OF HOLE

Monitoring Well

BACKFILLED

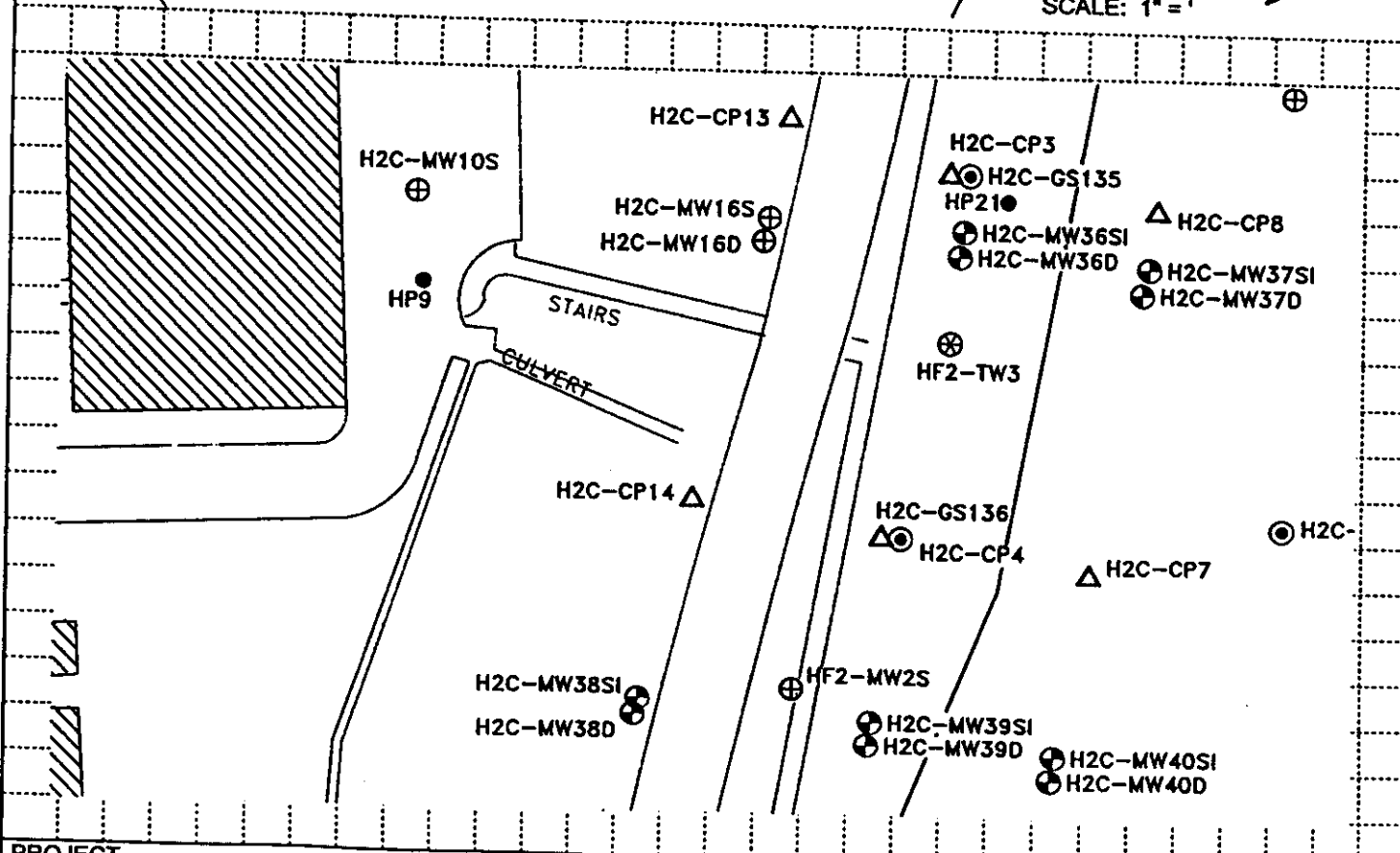
MONITORING WELL

OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR

LOCATION SKETCH/COMMENTS

SCALE: 1" = '



PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO

H2C-MW38D

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER H2C-MW38D	
PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska			INSPECTOR J. Covey				SHEET 2 OF 5 SHEETS	
ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)	
970.0	0	Silty CLAY (CL) - Soft, dark brown, moist, low plastic, with some organics						Fill
						1.0		Upper sample pushed 2 feet
969.0	1	Becomes medium stiff, brown, with trace fine to medium gravel				2.0		
		With no gravel				4.0		
		Becomes stiff				S		R=22/24
968.0	2					7		
		Becomes very organic				10		
967.0	3	Becomes light brown, with trace sand and iron staining				12		
		0.5" Seam of trace coarse-grained sand and fine gravel				14		
966.0	4					S		R=17/24
		Becomes medium stiff				3		
						5		
965.0	5	2" Seam of trace very fine sand	HS=10.9			6		
		Becomes black, medium plastic, with trace organics				9		
964.0	6					S		R=17/24
		Becomes soft				3		
963.0	7					3		
		Becomes grayish-brown, with trace very fine-grained sand				2		
						4		
962.0	8					S		R=17/24
						1		
961.0	9	Silty CLAY (CL) - Medium stiff, light brownish-gray, moist, low plastic, with trace calcite concretions				2		Peorian Loess
						3		
						4		
960.0	10		HS=12.6			S		R=18/24

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

H2C-MW38D

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN
Offutt AFB, Nebraska

INSPECTOR

J. Covey

SHEET

3 OF 5

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
960.0	10	SAME: Silty CLAY (CL) - Medium stiff, light brownish-gray, moist, low plastic, with trace calcite concretions				1	Peorian Loess
						2	
959.0	11					1	
						2	
958.0	12	With iron staining laminations Becomes gray				S	R=23/24
						2	
						3	
957.0	13					4	
		Silty CLAY (CL) - Soft, greenish-gray, wet, low plastic				5	
956.0	14					S	R=19/24
						1	Alluvial Silt and Clay
						2	
955.0	15	Becomes blackish-brown	HS=0.9			2	
		Becomes medium stiff, dark gray				4	
954.0	16	With trace calcite concretions				S	R=21/24
		Becomes light gray and sandy				3	
953.0	17	SAND (SP) - Poorly-graded, medium dense, light gray and white, wet, fine-to medium-grained				5	
						9	
952.0	18					11	Terrace Sand
						S	R=24/24
		Becomes fine-grained		Geo		2	
951.0	19					7	
						16	
950.0	20		HS=1.6			17	
						S	R=24/24

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO

H2C-MW38D

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER H2C-MW38D	
PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska			INSPECTOR J. Covey				SHEET 4	SHEETS OF 5
ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)	
950.0	20	SAME: SAND (SP) - Poorly-graded, medium dense, light gray and white, wet, fine-grained		Geo		1	Terrace Sand	
						9		
949.0	21	Increasing Silt content				16		
						20	Terrace Clay	
948.0	22	Silty CLAY (CL) - Stiff, gray wet, low plastic, with trace fine- to medium-grained sand 0.5" Seam of fine to very fine-grained sand				S	R=17/24	
				Geo		5		
						13		
947.0	23	SAND with SILT (SP-SM) - Poorly graded, medium dense, gray, wet, fine-grained				26	Terrace Sand	
				Geo		37		
946.0	24					S	R=22/24	
						6		
						7		
945.0	25		HS=2.1			10		
						21		
944.0	26					S	R=16/24	
						2		
						6		
943.0	27					10		
				Geo		15		
942.0	28	SAND (SP) - Poorly graded, medium dense, gray, wet, fine-grained				S	R=16/24	
						28		
		Becomes dense				31		
941.0	29					20		
						25		
940.0	30					S	R=10/24	

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO H2C-MW38D

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
H2C-MW38D

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN
Offutt AFB, Nebraska

INSPECTOR
J. Covey

SHEET 5 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
940.0	30	SAME: SAND (SP) - Poorly graded, dense, gray, wet, fine-grained				32	Terrace Sand
						78	
						80	
939.0	31			Geo		77	R=13/24
						S3	
						5	
938.0	32	Becomes medium to coarse-grained sand with trace fine gravel				10	
						16	
						22	
937.0	33			Geo		S	Glacial Till R=19/24
						13	
						24	
936.0	34	Silty CLAY (CL) - Hard, greenish-gray, moist, medium plastic, with trace medium- to coarse-grained sand				38	
						56	
						S	
935.0	35	Becomes gray					R=24/24
934.0	36						Bottom of Boring @ 36.0' Screen Interval from 28.5 to 33.3 ft. bgs.
933.0	37						
932.0	38						
931.0	39						
930.0	40						

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO H2C-MW38D

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

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HTRW DRILLING LOG

DISTRICT

USACE Omaha District

HOLE NUMBER

H2C-MW39D

1. COMPANY NAME

URS Corporation

2. DRILLING CONTRACTOR

Coranco

SHEET

SHEETS

1 OF 5

3. PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN

4. LOCATION

Offutt AFB, Nebraska

5. NAME OF DRILLER

T. Malosek

6. MANUFACTURER'S DESIGNATION OF DRILL

Mobile B-57

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

8-1/4" HSA (OD), AW Rods, Center Bit

8. HOLE LOCATION

H2C Parking Lot 30

9. SURFACE ELEVATION

970.0'

10. DATE STARTED

5/21/01

11. DATE COMPLETED

5/21/01

12. OVERBURDEN THICKNESS

N/A

15. DEPTH GROUNDWATER ENCOUNTERED

N/M

13. DEPTH DRILLED INTO ROCK

N/A

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED

10.3 @ 21 days

14. TOTAL DEPTH OF HOLE

35.5

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

N/A

18. GEOTECHNICAL SAMPLES (TESTED)

0

DISTURBED

0

UNDISTURBED

0

19. TOTAL NUMBER OF CORE BOXES

N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

None

VOC

N/A

METALS

N/A

OTHER (SPECIFY)

N/A

OTHER (SPECIFY)

N/A

OTHER (SPECIFY)

N/A

21. TOTAL CORE RECOVERY

N/A %

22. DISPOSITION OF HOLE

Monitoring Well

BACKFILLED

N/A

MONITORING WELL

H2C-MW39D

OTHER (SPECIFY)

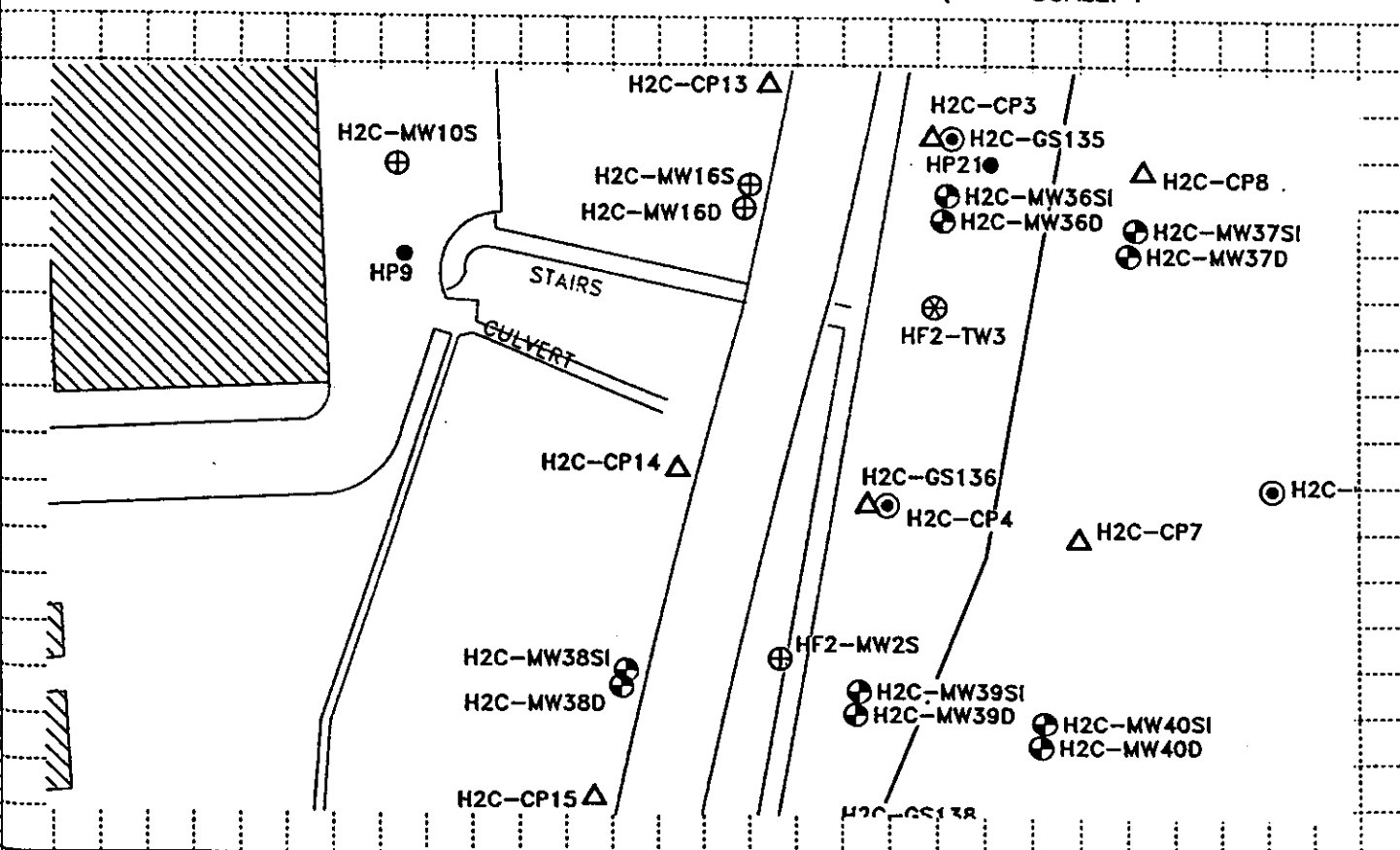
N/A

23. SIGNATURE OF INSPECTOR

[Signature]

LOCATION SKETCH/COMMENTS

SCALE: 1" = '



PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO

H2C-MW39D

ENG FORM 5056-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG (CONTINUATION SHEET)							HOLE NUMBER H2C-MW39D
PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska			INSPECTOR J. Covey			SHEET 2 OF 5	
ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
970.0	0	Asphalt					Pavement
969.0	1	Silty CLAY (CL) - Very stiff, brown with trace gray mottling, moist, low plastic					Fill
968.0	2	1" Seam of greenish-gray With trace calcite concretions					
967.0	3						
966.0	4	Becomes stiff, olive green to light gray, with some organics					
965.0	5	0.5" Seam of Clayey SAND, becomes grayish-green					
964.0	6	0.5" Seam of medium- to coarse-grained sand and fine gravel					
963.0	7	Becomes brown with trace black mottling					Driller notes rubble when drilling
962.0	8	0.25" Seam of medium- to coarse-grained sand Concrete rubble					
961.0	9						
960.0	10						

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO H2C-MW39D

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

H2C-MW39D

PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN
Offutt AFB, Nebraska

INSPECTOR

J. Covey

SHEET

SHEETS

3 OF 5

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
960.0	10	SAME: Concrete rubble					Concrete rubble
		Silty CLAY (CL) - Stiff, grayish-brown, moist, low plastic, with trace rust staining					Peorian Loess
959.0	11	Becomes light brown, with fine-grained sand					
		Becomes grayish-brown					
958.0	12						
		Sandy SILT (ML) - Medium stiff, brownish-gray, wet, fine-grained sand, with trace rust staining					Alluvial Silt and Clay
957.0	13						
956.0	14						
		Silty CLAY (CL) - Soft, gray, wet, low plastic, with trace iron staining					
955.0	15						
		Silty CLAY (CH) - Medium stiff, gray, wet, high plastic, with trace iron staining					
954.0	16						
		SILT (ML) - Medium stiff, gray, wet, low plastic, with iron staining					
953.0	17						
		Silty SAND (SM) - Dense, reddish-brown, wet, fine-grained					Alluvial Sand
952.0	18						
951.0	19						
950.0	20						

PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO

H2C-MW39D

EG)

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

<div style="display: flex; justify-content: space-between;"> HTRW DRILLING LOG (CONTINUATION SHEET) </div>							HOLE NUMBER H2C-MW39D
PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska				INSPECTOR J. Covey		SHEET 4 OF 5 SHEETS	
ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
950.0	20	SAME: Silty SAND (SM) - Dense, reddish-brown, wet, fine-grained					Alluvial Sand
949.0	21						
948.0	22						
947.0	23	Becomes medium dense 0.5" Seam of fine gravel Becomes gray					
946.0	24						
945.0	25						
944.0	26	Becomes SAND with SILT (SP-SM)					
943.0	27	Silty SAND (SM) - Dense, gray, wet, fine-grained With some clay					
942.0	28						
941.0	29	With trace clay					
940.0	30						

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO H2C-MW39D

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
H2C-MW39D

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN
Offutt AFB, Nebraska

INSPECTOR
J. Covey

SHEET 5 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
940.0	30	SAME: Silty SAND (SM) - Medium dense, gray, wet, fine-grained					Alluvial Sand
939.0	31						
938.0	32	Clayey GRAVEL (GC) - Grayish-brown, wet, fine gravel, subrounded to subangular, with some medium- to coarse-grained sand and cobbles to 2.5"					Glacial Outwash
937.0	33	Clayey SAND (SC) - Medium dense, light gray, wet, medium-grained sand, with trace coarse-grained sand and fine gravel Becomes greenish-gray					
936.0	34						
935.0	35						Driller notes hard drilling Glacial Till
934.0	36	CLAY (CH) - Very stiff, greenish-gray, wet, high plastic, with some medium- to coarse-grained sand					Bottom of Boring @ 35.5'
933.0	37						
932.0	38						
931.0	39						
930.0	40						

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO H2C-MW39D

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HTRW DRILLING LOG

DISTRICT

USACE Omaha District

HOLE NUMBER

H2C-MW40D

1. COMPANY NAME

URS Corporation

2. DRILLING CONTRACTOR

Coranco

SHEET

SHEETS

1 OF 5

3. PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN

4. LOCATION

Offutt AFB, Nebraska

5. NAME OF DRILLER

T. Malosek

6. MANUFACTURER'S DESIGNATION OF DRILL

Mobile B-57

7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT

8-1/4" HSA (OD), AW Rods, 2" Split

Spoon

8. HOLE LOCATION

H2C Parking Lot 30

9. SURFACE ELEVATION

970.0'

10. DATE STARTED

5/7/01

11. DATE COMPLETED

5/7/01

12. OVERBURDEN THICKNESS

N/A

15. DEPTH GROUNDWATER ENCOUNTERED

10.5' during drilling

13. DEPTH DRILLED INTO ROCK

N/A

16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED

13.3 @ 35 days

14. TOTAL DEPTH OF HOLE

31.0

17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

N/A

18. GEOTECHNICAL SAMPLES (TESTED)

9

DISTURBED

9

UNDISTURBED

0

19. TOTAL NUMBER OF CORE BOXES

N/A

20. SAMPLES FOR CHEMICAL ANALYSIS

None

VOC

METALS

OTHER (SPECIFY)

OTHER (SPECIFY)

OTHER (SPECIFY)

21. TOTAL CORE RECOVERY

N/A %

22. DISPOSITION OF HOLE

Monitoring Well

BACKFILLED

MONITORING WELL

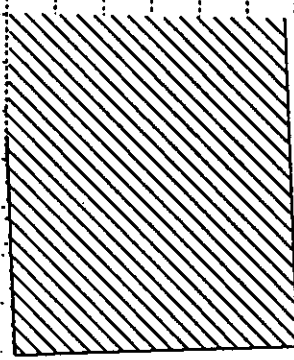
OTHER (SPECIFY)

23. SIGNATURE OF INSPECTOR

[Signature]

LOCATION SKETCH/COMMENTS

SCALE: 1" = '



H2C-MW10S

HP9

STAIRS

CULVERT

H2C-CP13

H2C-MW16S

H2C-MW16D

H2C-CP14

H2C-MW38SI

H2C-MW38D

H2C-CP15

H2C-CP3

H2C-GS135

HP210

H2C-MW36SI

H2C-MW36D

HF2-TW3

H2C-GS136

H2C-CP4

HF2-MW2S

H2C-MW39SI

H2C-MW39D

H2C-CP8

H2C-MW37SI

H2C-MW37D

H2C-CP7

H2C-

HOLE NO

H2C-MW40D

PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

ENG FORM 5056-R, AUG 94

(Proponent: CECW-EG)

(CONTINUATION SHEET)

H2C-MW40D

INSPECTOR

J. Covey

SHEET

SHEETS

2

5

PROJECT	OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska	HOLE NO	H2C-MW40D
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HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER
H2C-MW40D

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN
Offutt AFB, Nebraska

INSPECTOR
J. Covey

SHEET 3 OF 5 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
960.0	10	SAME: Concrete rubble					Fill Driller notes end of rubble
959.0	11	Silty SAND (SM) - Medium dense, gray with trace brown, wet, fine-grained sand				10	Alluvial Sand
						15	
958.0	12			Geo		3	R=15/18
						S	No Sample: Driller overdrilled
957.0	13						
956.0	14					3	
						1	
955.0	15	Sandy SILT (ML) - Very soft to soft, gray, wet, low plastic, with fine sand				3	Alluvial Silt and Clay
		Silty CLAY (CL) - Soft, gray, wet, low plastic, with trace iron staining				3	
954.0	16					S	R=15/24
						1	
953.0	17	With trace very fine-grained sand				3	
						3	
952.0	18	Becomes medium plastic		Geo		4	R=19/24
						S	
951.0	19		HS=1.6			2	
						2	
						4	
950.0	20	Silty SAND (SM) - Medium dense, gray, wet, fine-grained sand		Geo		8	Alluvial Sand
						S	R=24/24

PROJECT OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO
H2C-MW40D

ENG FORM 5056A-R, AUG 94

(Proponent: CECW-EG)

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

H2C-MW40D

PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN
Offutt AFB, Nebraska

INSPECTOR

J. Covey

SHEET

SHEETS

4 OF 5

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
950.0	20	SAME: Silty SAND (SM) - Medium dense, gray, wet, fine-grained sand				2	Alluvial Sand Added drilling mud
						4	
949.0	21	Silty CLAY (CH) - Medium stiff, gray, wet, high plastic		Geo		8	Interbedded Alluvium
		Silty SAND (SM) - Medium dense, gray, wet, fine-grained sand		Geo		8	
948.0	22	Silty CLAY (CH) - Medium stiff, gray, wet, high plastic, with trace fine-grained sand				S	R=16/24
		Silty SAND (SM) - Loose, gray, wet, fine-grained				6	
						1	
947.0	23	Silty CLAY (CH) - Medium stiff, gray, wet, medium plastic				2	
						4	
946.0	24	Silty SAND (SM) - Loose, gray, wet, fine-grained		Geo		S	R=24/24
		1" Seam of medium plastic clay				2	
		Silty CLAY (CH) - Medium stiff, gray, wet, medium plastic, with trace sand				3	
945.0	25	Sandy SILT (ML) - Medium stiff, gray, wet, fine-grained sand				4	
		Silty SAND (SM) - Loose, gray, wet, fine-grained sand		Geo		4	
944.0	26	Silty CLAY (CL) - Stiff, gray, wet, medium plastic				S	R=18/24
		Silty SAND (SM) - Medium dense, gray, wet, fine-grained sand				6	Alluvial Sand
						9	
943.0	27					10	
				Geo		12	
942.0	28					S	R=24/24
		With trace medium gravel				27	
						13	
941.0	29	Silty CLAY (CL) - Very stiff to hard, gray with trace grayish-green, moist, low to medium plastic, with trace medium- to coarse-grained sand		Geo		12	Glacial Till
						21	
940.0	30					S	R=24/24

PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO

H2C-MW40D

HTRW DRILLING LOG

(CONTINUATION SHEET)

HOLE NUMBER

H2C-MW40D

PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN
Offutt AFB, Nebraska

INSPECTOR

J. Covey

SHEET

SHEETS

5 OF 5

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO. (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNT (g)	REMARKS (h)
940.0	30	SAME: Silty CLAY (CL) - Very stiff to hard, gray with trace grayish-green, moist, low to medium plastic, with trace medium- to coarse-grained sand					Glacial Till
939.0	31						Bottom of Boring @ 31.0' Screen Interval from 23.6 to 28.4 ft. bgs.
938.0	32						
937.0	33						
936.0	34						
935.0	35						
934.0	36						
933.0	37						
932.0	38						
931.0	39						
930.0	40						

PROJECT

OFFUTT FY01 - HF2C PRB PRE-DESIGN Offutt AFB, Nebraska

HOLE NO

H2C-MW40D

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APPENDIX B

SITE PLANS AND PLUME INFORMATION

Fig 8-1	SITE PLAN HARDFILL 2 COMPOSITE, OFFUTT AFB, NEBRASKA
Fig 8-13	SOUTHERN PLUM TOTAL CAH ISOCONCENTRATION MAP
Fig 2-4	GEOLOGIC CROSS-SECTIONS & TOTAL CAH ISOCONCENTRATIONS HF2 COMP. SITE
Fig 1	SITE PLAN FIRE TRAINING AREA 2 (Near Apron)
HGS	HISTORICAL GROUNDWATER SAMPLING

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NORTHERN PLUME CORE ($>1000 \mu\text{g/L CAH}$)

LEGEND

H2C-MW181

S,I,D

FY01 monitoring well
sampling point

S= Shallow

I= Intermediate

D= Deep

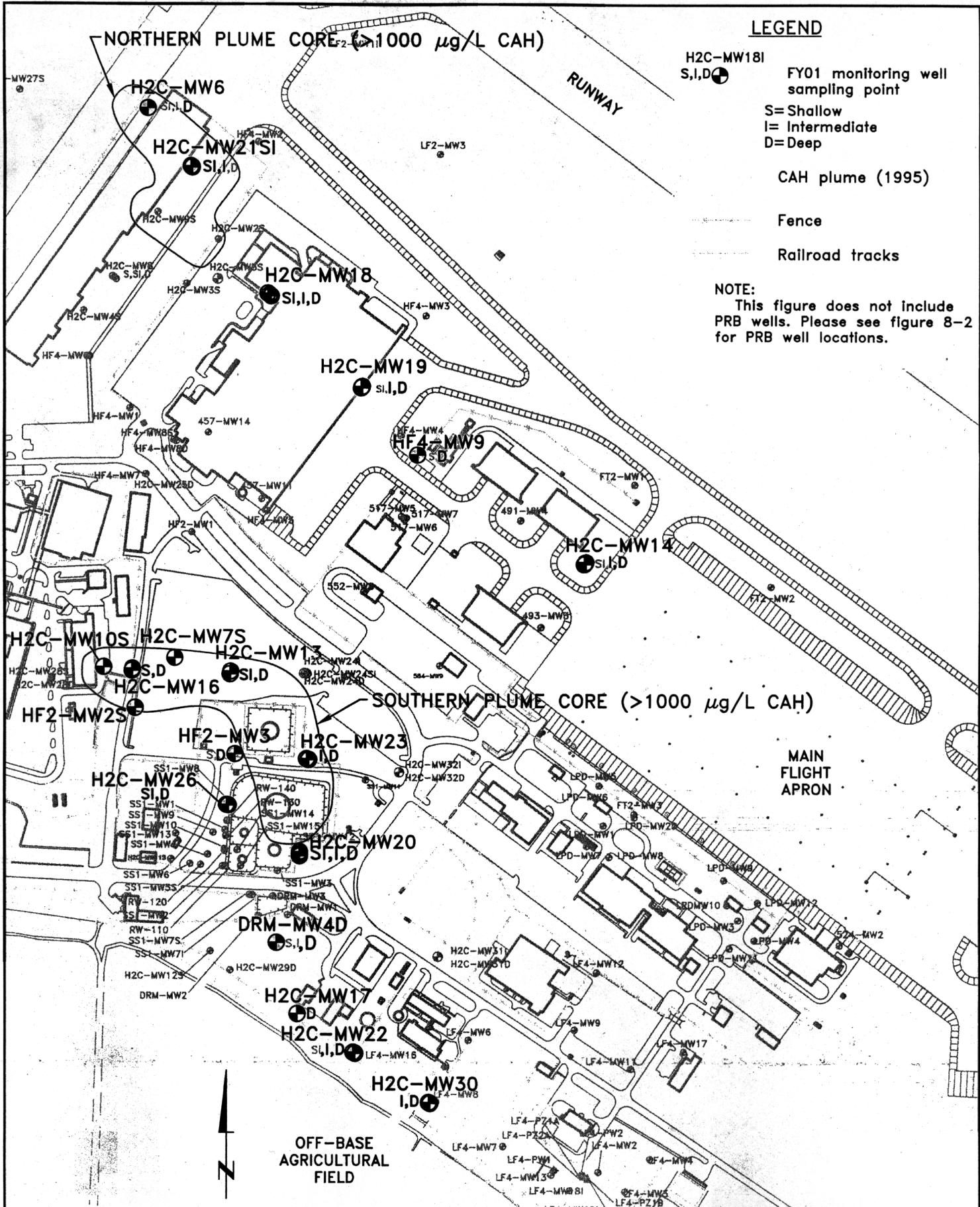
CAH plume (1995)

Fence

Railroad tracks

NOTE:

This figure does not include
PRB wells. Please see figure 8-2
for PRB well locations.



OFF-BASE
AGRICULTURAL
FIELD

MAIN
FLIGHT
APRON

500 250 0 500

SCALE IN FEET

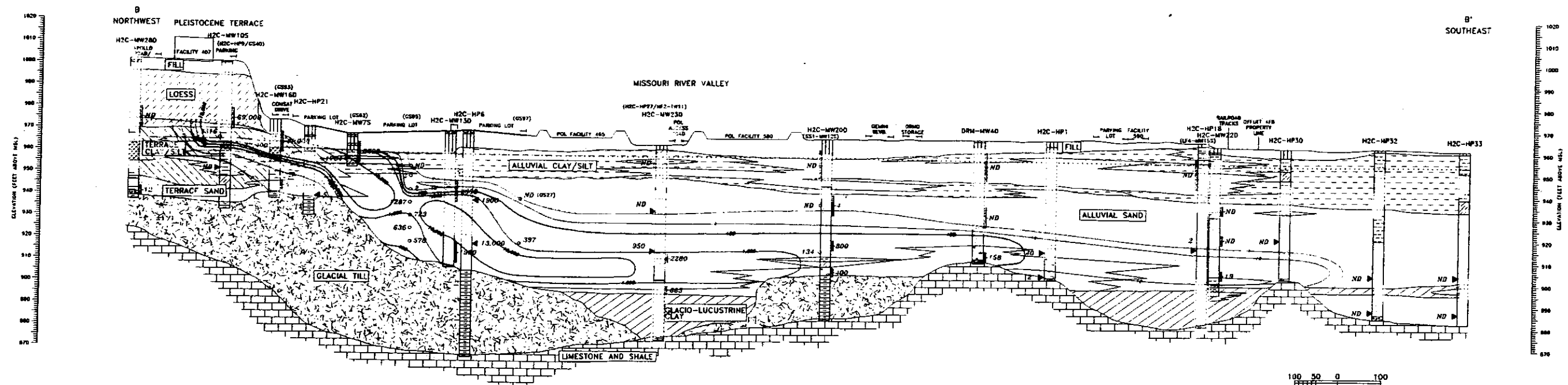
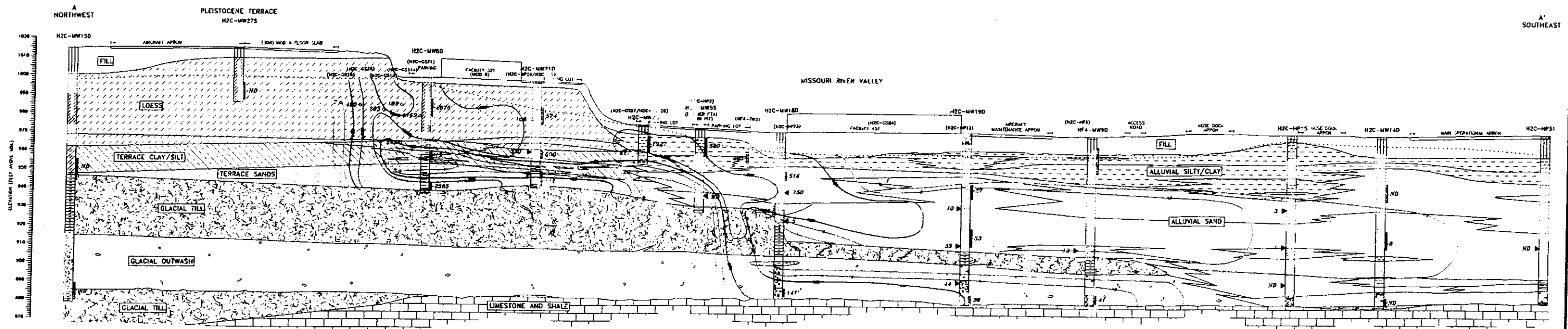
SITE PLAN
HARDFILL 2 COMPOSITE
OFFUTT AFB, NEBRASKA

September 25, 2002 1:20:31 p.m.
Drawing: T:\OFFUTT\M9602C1\210\FIG8-1.DWG

DRN. BY: DPG	DATE: 1/23/01	PROJECT NO. 45-FM9602C1.00	FIG. NO. 8-1
CHK'D. BY: DLJ	REVISION: 0		

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NOTES

- GROUNDWATER FLOW PATTERNS ALONG GEOLOGIC CROSS-SECTION B-B' ARE DEPICTED ON FIGURE 2-5.
- THIS FIGURE REPRESENTS A CONCEPTUAL CAH EXTENT AND GEOLOGIC MODEL. THE ACTUAL LITHOLOGY AND CAH CONCENTRATIONS BETWEEN BORINGS AND SAMPLES MAY VARY FROM THE SHOWN INTERPRETATION.

LEGEND

TARGET CAHS TRICHLOROETHENE, 1,2-DICHLOROETHENE, 1,1-DICHLOROETHENE, AND VINYL CHLORIDE

ISOCONCENTRATION CONTOURS FOR TOTAL TARGET CAHS:

—10,000— 10,000 $\mu\text{g/L}$
 —1,000— 1,000 $\mu\text{g/L}$
 —100— 100 $\mu\text{g/L}$
 —10— 10 $\mu\text{g/L}$
 —1— 1 $\mu\text{g/L}$

April 24, 1997 1:14:00 p.m.
 Drawing: T:\OFFUTT\M9408H\F1-3T101B.DWG (BAG)

GEOLOGIC CROSS-SECTIONS AND TOTAL CAH ISOCONCENTRATIONS			
HF2 COMPOSITE SITE		OFFUTT AFB, NEBRASKA	
DRN. BY: BAG	DATE: 02/25/97	PROJECT NO. C3M11TT	FIG. NO. 2-4
CHK'D. BY:	REVISION: 0		

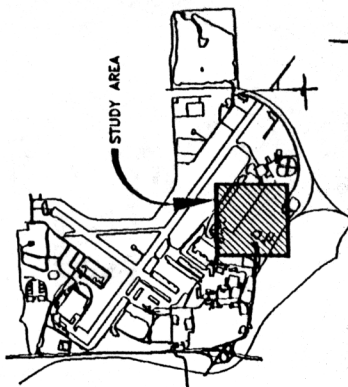
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⊕ Existing Monitoring Well (ESI, 1989)
 ⊕ Existing Low Point Drain Monitoring Well (WCC, 1992)
 - - - Suspected Fire Training Area Location

- Fence
- ▣ Structure
- Existing Land Use
- Landfill 4

200
(SCALE IN FEET)

NOTE: Locations are approximate
SOURCE: Offutt AFB maps and aerial photos



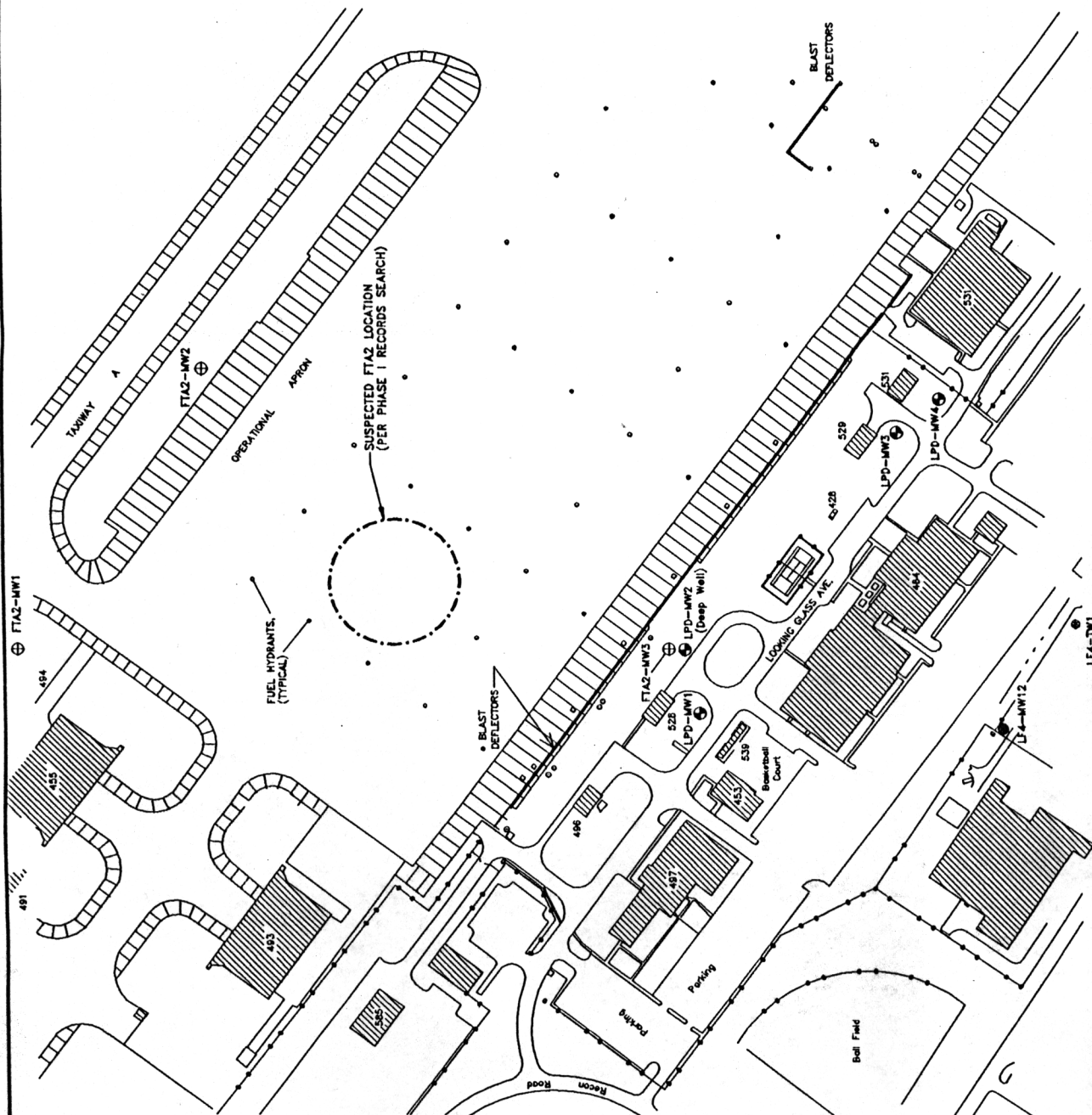
SITE LOCATION PLAN



Woodward-Clyde Consultants
ENGINEERING & SCIENCES APPLIED
TO THE EARTH & ITS ENVIRONMENT

SITE PLAN
FIRE TRAINING AREA 2
OFFUTT AIR FORCE BASE NEBRASKA

DATE: SEPT. 1992	PROJECT NO. DSMC208F	FIG. NO. 1
DRAWN BY: C.J.G.	DESIGNED BY: J.H.	REVISION: 0



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HISTORICAL GROUNDWATER SAMPLING

Well	Sampling Date	Top of Screen	Bottom of Screen	Contaminant	Value	MCL	UNITS	MATRIX	Analytical Method	Extraction Method
LPD-MW6	30-Nov-95	7.4	16.9	1,2-DICHLOROETHANE	9		5 UG/L	GW	SW8240	SW5030
LPD-MW6	30-Nov-95	7.4	16.9	TOTAL 1,2-DICHLOROETHENE	30		5 UG/L	GW	SW8240	SW5030
LPD-MW10	01-Dec-95	6.9	16.4	TOTAL 1,2-DICHLOROETHENE	36		5 UG/L	GW	SW8240	SW5030
LPD-MW1	01-Dec-95	6	15	BENZENE	52		5 UG/L	GW	SW8240	SW5030
LPD-MW6	30-Nov-95	7.4	16.9	BENZENE	420		5 UG/L	GW	SW8240	SW5030
LPD-MW10	01-Dec-95	6.9	16.4	BENZENE	1		5 UG/L	GW	SW8240	SW5030
LPD-MW8	30-Nov-95	7.4	16.9	PETROLEUM HYDROCARBONS	0.6		1 MG/L	GW	E418.1	M3510
LPD-MW5	30-Nov-95	7.4	16.9	PETROLEUM HYDROCARBONS	0.6		1 MG/L	GW	E418.1	M3510
LPD-MW10	01-Dec-95	6.9	16.4	PETROLEUM HYDROCARBONS	0.7		1 MG/L	GW	E418.1	M3510
FT2-MW3	30-Nov-95	5.5	20.5	PETROLEUM HYDROCARBONS	0.8		1 MG/L	GW	E418.1	M3510
LPD-MW6	30-Nov-95	7.4	16.9	PETROLEUM HYDROCARBONS	0.9		1 MG/L	GW	E418.1	M3510
LPD-MW1	01-Dec-95	6	15	PETROLEUM HYDROCARBONS	110		1 MG/L	GW	E418.1	M3510
LPD-MW10	01-Dec-95	6.9	16.4	TRICHLOROETHYLENE (TCE)	5		5 UG/L	GW	SW8240	SW5030

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APPENDIX C

FINAL REPORT

CONTAMINATION INVESTIGATION

HYDRANT FUEL SYSTEM
OFFUTT AIR FORCE BASE

BELLEVUE, NEBRASKA



Prepared by

U.S. ARMY CORPS OF ENGINEERS
OMAHA DISTRICT

November 2003

TABLE OF CONTENTS

PAGE

1.0 BACKGROUND	1
1.1 Objective.....	1
1.2 Investigation Location	1
2.0 FIELD INVESTIGATION SUMMARY	1
3.0 DESCRIPTION OF INVESTIGATION.....	2
3.1 Concrete Coring.....	2
3.2 Direct Push Sampling Procedures	2
3.3 Environmental Soil Sampling.....	2
3.4 Headspace Screening Procedures	3
3.5 Site Conditions	3
3.5.1 Significant Environmental Observations	3
3.5.2 Site Geology	5
3.5.3 Ground Water.....	5
3.6 Air Monitoring.....	6
3.7 Decontamination.....	6
3.8 Investigation Derived Waste Management and Borehole Closure.....	6
4.0 PACKAGING AND SHIPMENT.....	6
5.0 PROTECTION LEVEL	6

TABLES:

TABLE 1 - Environmental Sampling Information	4
--	---

ATTACHMENTS:

APPENDIX A - Quantities Estimate and Sampling Location Map
APPENDIX B - Chain of Custody Records
APPENDIX C - Sample Description Logs
APPENDIX D - Chemical Quality Assurance Report

Contamination Investigation Report
Sub-Surface Soil Sampling in the Vicinity of
Proposed Hydrant Fuel System
Offutt Air Force Base, Bellevue, Nebraska

1.0 BACKGROUND

Design work for the new hydrant fuel system at Offutt AFB is being performed by the Omaha District, US Army Corps of Engineers (USACE). As part of the design effort, Omaha District was tasked with environmental sampling and analysis of soils in the vicinity of the proposed new fueling system to determine if contamination is present in sufficient quantities that would significantly impact the construction of the project.

Several documented contaminant releases to the environment have occurred at Offutt AFB as a result of landfill use, discharges to wastewater systems, fire training activities, and accidental spills and leaks. Subsurface plumes containing fuels and solvents such as trichloroethylene are known to exist in the area groundwater.

1.1 Objective

The objective of this site investigation was to determine if suspected petroleum hydrocarbon and VOC contamination exists in sub-surface soils underlying the proposed project boundaries (see Appendix A), which may necessitate special soil excavating (for worker health and safety) and handling/disposal procedures and conditions that will be required during construction.

1.2 Investigation Location

The field investigation described in this report was conducted along the alignment of the new hydrant fuel system. Refer to Appendix A for a site map.

2.0 FIELD INVESTIGATION SUMMARY

An Omaha District drill crew conducted the contamination investigation for the Hydrant Fuel System at Offutt AFB on 15 to 20 October 2003. The investigation originally consisted of 18 direct push soil sampling borings, numbered sequentially OF03DP01 through OF03DP18. However, location OF03DP04 was not sampled due to the presence of a parked aircraft for the duration of the field effort.

Sub-surface soil samples were collected for headspace screening and laboratory analysis using a SIMCO EARTHPROBE™ 200 direct push rig equipped with 2-inch nominal diameter outer rods and a 1-inch diameter by 2-foot long steel split spoon sampler.

Eighteen (18) environmental sampling locations were selected for placement over the project site based on the planned layout of the hydrant fuel system. These borehole locations were marked in the field using spray paint to assist in underground utility location work. An Offutt AFB digging permit was obtained prior to conducting fieldwork.

Collected soil samples have been analyzed for gasoline, diesel, and VOCs using the following laboratory methods: TPH-DRO (8015B) and VOC-GRO (8260B). The samples were analyzed by the USACE Environmental Chemistry Branch Laboratory in Omaha, NE.

3.0 DESCRIPTION OF INVESTIGATION

3.1 Concrete Coring

Pavement coring was performed using a Milwaukee, 20-amp, rotary drill equipped with 2-inch nominal diameter diamond core barrel. The pavement was patched using a high strength (5,000 psi) concrete mix.

3.2 Direct Push Sampling Procedures

The soil sampling for this investigation was performed by advancing the direct push outer rods to pre-determined sample depths, removing the center drive point, inserting the split-spoon sampler inside the outer rods, and driving the spoon ahead of the outer rods to collect the sample. A portion of the sample was used for headspace screening (paragraph 3.4). The remainder was prepared for lab analysis, when applicable (paragraph 3.3).

3.3 Environmental Soil Sampling

Prior to collecting samples, the split-spoon samplers were cleaned to eliminate any possible cross contamination as described in Section 3.7 -"Decontamination". Soil samples were acquired from 17 test holes. Sample intervals for environmental soil analysis at each borehole were originally planned at 5, 10, and 15 feet below pavement surface (or ground surface), with the stipulation that the deepest sample be adjusted if the groundwater occurred shallower than 15 feet so that the sample is collected above groundwater. Unexpected shallow groundwater, primarily under the apron, necessitated field changes to the original sampling plan. The original sampling plan specified samples be collected from 5, 10, and 15 feet for headspace screening. Additionally, soil samples for laboratory chemical analyses were to be collected from the 10 and 15-foot intervals. The 15-foot sample was to be submitted for lab analyses only if the headspace PID measurement was higher than the 10-foot sample. Each soil sample consists of 3 Encore[®] samplers for VOC/GRO and one 4-ounce jar for percent solids and DRO analyses. Groundwater was encountered between approximately 6.5 and 7.5 in all the borings under the apron. As a result, using the criteria to collect the samples above ground water, no samples from any of the borings under the apron were submitted to the laboratory for chemical analyses. Additionally, with the exception of the first hole sampled (DP03) the 15-foot samples were not even attempted due to the saturated conditions and heaving sands. The borings located off of the apron (DP12 through DP18) encountered subsurface conditions close to what was expected enabling the sampling to be conducted essentially in accordance with the original sampling plan.

After the split-spoon sampler was retrieved, it was opened and immediately scanned by sight, smell, and with a PID for signs of possible fuel contamination.

After PID scanning, the environmental samples for VOC analysis were immediately captured in three five-gram Encore[®] sample cups, capped securely, then placed into sealable foil pouches for storage in iced shipping coolers. The remainder of the recovered soil in the opened split-spoon

was then placed into a 4-ounce jar for the remaining analyses and/or a baggie for headspace screening.

The Chemical Quality Assurance Report for the soil analyses may be found in Appendix D. Assumptions for using soil data to determine quantities of contaminated soil may also be found in this Appendix.

3.4 Headspace Screening Procedures

The soil samples were screened for volatile organic compounds in the field at the time of sample collection. Field screening was performed using a Photovac 2020 photo-ionization detector (PID). The field screening was performed in accordance with the following procedures.

- Immediately upon opening the split-spoon and after collecting the Encore sample (when required), a representative portion of the sample was collected and placed in a new, clean, plastic sandwich bag placed inside a jar. Readings were periodically taken inside empty bags to ensure no external contamination was being introduced.
- The jar was then sealed with at least one continuous sheet of aluminum foil, using the jar lid to secure the foil.
- The jar was then vigorously agitated for at least fifteen seconds and then allowed a minimum of ten minutes for the sample to adequately volatilize.
- After re-shaking the jar, the lid was removed and the vapor sampling probe was quickly inserted through the aluminum foil. The maximum meter response (within first two to five seconds) was recorded.
- The headspace screening data was recorded on the Sample Description Log.
- The screening instrument was calibrated using 100 ppm isobutylene span gas at the start of each workday and periodically throughout the day as determined appropriate by the geologist in the field.

3.5 Site Conditions

3.5.1 Significant Environmental Observations

Sample Identification Numbers and depths, date sampled, and headspace results are shown on Table 1. The sampled borehole locations are shown in Appendix A. Sample Description Logs are included in Appendix C. Chain of custody information can be viewed in Appendix B. The sample numbers consist of the boring number followed by the depth. For example: the 8 to 10-foot deep sample from boring OF03DP12 is OF03DP12-08. The 4 to 6-foot sample is OF03DP12-04.

TABLE 1 - Environmental Sampling Information

Sample ID.	Date	Headspace Results (ppm)	Lab*
OF03DP01-04	10/17/03	1.2	
OF03DP01-06	10/17/03	0.0	
OF03DP01-08	10/17/03	0.0	
OF03DP02-04	10/17/03	0.1	
OF03DP02-06	10/17/03	0.0	
OF03DP02-08	10/17/03	0.0	
OF03DP03-05	10/15/03	0.7	
OF03DP03-10	10/15/03	0.0	
OF03DP03-15	10/15/03	0.0	
OF03DP05-02	10/20/03	3.1	
OF03DP05-04	10/20/03	0.0	
OF03DP05-06	10/20/03	0.0	
OF03DP06-04	10/16/03	0.0	
OF03DP06-06	10/16/03	0.0	
OF03DP07-04	10/20/03	0.0	
OF03DP07-08	10/20/03	0.0	
OF03DP08-04	10/16/03	0.0	
OF03DP08-08	10/16/03	No Sample	
OF03DP09-02	10/20/03	0.0	
OF03DP09-04	10/20/03	0.0	
OF03DP10-02	10/20/03	0.0	
OF03DP10-04	10/20/03	0.0	
OF03DP10-06	10/20/03	0.0	
OF03DP11-04	10/21/03	0.0	
OF03DP11-06	10/21/03	0.0	
OF03DP11-08	10/21/03	0.0	
OF03DP12-04	10/21/03	0.0	
OF03DP12-06	10/21/03	0.0	
OF03DP12-08	10/21/03	0.0	X
OF03DP13-04	10/17/03	0.0	
OF03DP13-08	10/17/03	0.0	
OF03DP13-12	10/17/03	0.0	
OF03DP14-04	10/17/03	0.0	
OF03DP14-08	10/17/03	0.0	X
OF03DP14-12	10/17/03	0.0	
OF03DP15-04	10/16/03	0.0	
OF03DP15-08	10/16/03	0.0	X
OF03DP15-14	10/16/03	0.0	
OF03DP16-04	10/21/03	0.0	

Sample ID.	Date	Headspace Results (ppm)	Lab*
OF03DP16-08	10/21/03	0.0	X
OF03DP16-12	10/21/03	0.0	
OF03DP17-04	10/21/03	1,872	
OF03DP17-08	10/21/03	4.4	X
OF03DP17-12	10/21/03	0.0	
OF03DP18-05	10/16/03	0.9	
OF03DP18-10	10/16/03	0.0	X
OF03DP18-15	10/16/03	0.0	

- “X” indicates sample was submitted to laboratory for chemical analyses.

As can be seen from the table above, with the exception OF03DP17, all headspace measurements were zero or very low. The headspace screening results suggests there is no widespread contamination under the apron or the project area in general. The high headspace reading in OF03DP17 was measured in a sand seam at approximately 5.2 to 5.8 feet bgs. A strong odor was also reported. These findings suggest that there may be significant contamination in the vicinity of this boring, which is located near pump house 529.

A total of six (6) samples were sent to the lab for chemical analyses. There were two relatively low detections of TPH/DRO and one low detection of Benzene. The results of the lab testing are presented in Appendix D. The lab results further suggest that significant contamination appears to be somewhat localized and does not appear to be widespread in the project area.

3.5.2 Site Geology

The material underlying the apron pavement consists primarily of fine-grained sand. The material appears to be the hydraulic fill that was reportedly placed in this area of the Base in the 1950s. Heaving sand conditions were often reported below the water table. Heaving sand during drilling and sampling often indicate that unstable excavations below ground water can be anticipated. The material west/southwest of the apron appears to consist of interbedded sands (SP) and clays (CL) and may be representative of the natural soils in the area. Refer to the Sample Description Logs in Appendix C for more detailed descriptions of the subsurface materials encountered during this investigation.

3.5.3 Ground Water

Ground water was reported in all of the borings. The borings under the apron encountered ground water at approximately 6.5 to 7.5 feet bgs. This was considerably shallower than was anticipated. Prior to this investigation, ground water under the apron was assumed to be 12 feet bgs or deeper. The estimated depth was based on water levels in monitoring wells in the vicinity of the apron, but not in the apron. Ground water levels reported in the borings off the apron ranged between 10 and 14 feet bgs and are close to what was expected. It is possible that the deeper water levels off the apron may be more representative of the natural soils in the area and the higher water levels under the apron represent “perched” conditions in the hydraulic fill.

It should be noted that ground-water levels can only be approximated when using a direct push rig. As a result, the levels reported herein should be considered approximate. Accurate levels would require the installation of piezometers or observation wells.

3.6 Air Monitoring

Air monitoring was conducted periodically for worker health and safety. A PID was used each day to measure total organic vapors near the breathing zone, emanating from each open borehole. The PID was calibrated with 100 parts per million (PPM) isobutylene at the start of each work day and periodically during the day. No significant organic vapors presenting a health and safety concern were reported over any borehole during this field investigation.

3.7 Decontamination

The drive rods were decontaminated prior to drilling and between each boring by high-pressure hot water cleaning. The split-spoon sampler was hand washed using a liquinox and water solution, tap water rinse, and a distilled water final rinse between each sample depth and sample borehole.

3.8 Investigation Derived Waste Management and Borehole Closure

The use of a direct push rig essentially eliminated the generation of cuttings and the only IDW produced were the soil samples that were not sent to the lab. Since essentially no contaminated soil was detected by the headspace screening methods the samples were placed in a bucket and disposed of in a dumpster at the USACE, Omaha Core Drill Facility. The borings were backfilled with Enviroplug (bentonite) and water.

4.0 PACKAGING AND SHIPMENT

Following proper collection and labeling, the sample jars were placed in plastic bubble wrap, sealed in plastic baggies, and placed on ice in a cooler. The Encore Samples were placed in their foil packets, sealed in baggies, and placed on ice in a cooler. Each cooler was filled with double-bagged cubed ice to cool the samples to 4 degrees centigrade. The completed chain of custody (COC) form was placed in a Ziploc bag and taped to the inside of each cooler lid. Custody seals were numbered, dated, signed, and affixed to the outside of each cooler. The seals were placed across the lid opening so that the coolers could not be opened without breaking the seals. Finally, the coolers were sealed with fiber strapping tape. The coolers were delivered to the Environmental Chemistry Branch Lab at 420 S. 18th Street, Omaha, NE at the end of each workday.

5.0 PROTECTION LEVEL

Soil sampling was conducted under worker protection level D. Protection Level D consisted of appropriate fieldwork clothing, hardhat, earplugs, eye protection, Nitrile gloves, and steel toed leather boots.

APPENDIX A

Quantities Estimate & Sampling Location Map

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Appendix A: Quantities Estimate and Sampling Location Map
Sub-Surface Soil Sampling in the Vicinity of
Proposed Hydrant Fuel System
Offutt Air Force Base, Bellevue, Nebraska

1.0 APPROACH AND ASSUMPTIONS

1.1 Approach

The objective of this section is to assess the potential for petroleum hydrocarbon and VOC contamination in sub-surface soils underlying the proposed project features, and to estimate the quantities of soil that may require special excavating and handling/disposal procedures during construction. Determining the extent of contaminated areas beyond the specific project excavations was not included in the scope of the investigation.

The potential for contaminated soil was determined using existing data from previous environmental investigations as well as that obtained during this investigation. Volume estimates were calculated from assumptions relating to that potential and generalized geometry of anticipated excavations. These represent conservative figures. Limitations of the investigation necessitated in some cases the use of best guess estimates regarding the potential for contamination.

An existing hydrant fueling system consisting of at least eight lateral fuel pipes and associated fuel pits is present under the apron. Leaks from these lateral lines present the greatest potential for subsurface contamination, thus the points where they intersect the new fuel line loop were targeted for investigation. The scope of the investigation did not allow sampling at every intersection, and parked aircraft further restricted the number and location of sample points. Additional points were located along the proposed transfer pipe route from the new pump house to the truck fueling stand and apron, as these areas are known to have contamination at depth. Borings were also made near the underground storage tanks adjacent to existing pump houses 528 and 529 since their removal is an option in the project.

1.2 Assumptions

For these calculations it is assumed that the fuel lines under the apron and other pavement will be installed by shoring the trench sides vertically prior to excavation. Due to the high water table under the apron, and the presence of fine-grained, hydraulically-placed heaving sand in the subsurface, it is improbable that un-shored excavations with a depth of 9 feet, a bottom width of 6 feet and a top width of not more than one 25 foot pavement slab (yielding an approximately a 1 horizontal to 1 vertical slope) will remain stable. Vertically shored trenches will have approximately 9-foot high walls and a 6-foot wide base. Subtracting the top foot of material as pavement, a cross-sectional soil area of 48 square feet, or 5.33 square yards results.

Hydrocarbons released from existing fuel lines would most likely be present from the elevation of the line upward to at least the top of the water column and possibly higher if water levels have fluctuated. For the purposes of this project it is assumed that the full depth of the trench will be contaminated if there has been a release. Contaminated soils under pavement may be returned to the excavation if the pavement is being replaced as long as it is otherwise suitable for use as subgrade. Soil saturated with fuel could not be made suitable, however indications are that this is not the case. Water-saturated soil would be unsuitable for use as subgrade unless it is dried by blending with other materials or allowed to air dry. Dewatering of the excavation to an elevation two feet below the working level is specified to occur prior to reaching that level; therefore the material should be in an unsaturated state and mainly useable if blended with drier subgrade.

The underground fuel tanks excavations at pump houses 528 and 529 are assumed to consist of walls sloped at 1 horizontal to 1 vertical, with a bottom footprint 85 feet in length and 45 feet in width, with a total depth of 15 feet (1-foot below the base of the tanks). Note that this depth is anticipated to be below the reported ground water elevation. Ground water contamination plumes have been documented extending south of both buildings, and a PID reading and physical description of soil at a depth of 5 feet west of the tanks at building 529 during this investigation indicate that hydrocarbons may be present above the ground water elevation as well. With these data in mind it is assumed that a majority of the overburden above the tanks is clean, but that from the midpoint of the tank to the base of the excavation contaminated soil will be encountered.

New above ground storage tanks will require excavation to a depth of 5 feet below existing grade for installation of steel H-pile foundations. These excavations are assumed to extend a distance of 5 feet beyond the tank perimeter for a diameter of 60 feet. Because of the potential for past releases from the existing tanks in the area, it is assumed that this soil will contain hydrocarbons.

The new pump house is sited on what is currently an asphalt parking lot reportedly underlain by rubble fill. The excavation for removal of the rubble and placement of structural fill will extend a distance of five feet beyond the building footprint to a depth of 6.5 feet as indicated in the geotechnical report.

2.0 AREAS OF POTENTIAL CONTAMINATED SOIL

This investigation discovered little indication of contamination under the apron at the sample locations. Additional information was obtained from TRACER data conducted on the existing fuel lines. This data was generated from collection of vapor in the soil surrounding the fuel lines, and gives an indication of the potential for volatile hydrocarbon contamination. A reading of 100 milligrams per liter (mg/l) is generally considered the threshold of concern. Only one location where the new fuel line is situated recorded a concentration above the threshold; between pits B-4 and B-5 a reading of 115 mg/l was reported. Parked aircraft prevented advancing a boring near this location, however boring OF03DP01 was located approximately

160 feet away and did not encounter contamination. TRACER data is not available for the adjacent lateral line on the opposite side, however at a distance of approximately 320 feet the concentrations were negligible (see Sampling Location Map for locations of TRACER data). The conservative approach is to assume that the elevated TRACER reading indicates a reasonable potential for contamination. A common method is to assume contamination extends from the known point halfway to an adjacent clean point. In this case, points of no reported contamination exist 160 feet away on one side and 320 feet on the other. Thus the maximum probable length of contaminated pipe run is 250 feet. No other indications of contaminated soil under the apron were encountered, however the spacing of sampling points was necessarily large and small pockets of hydrocarbons could be present between points. An additional length of 100 lineal feet is assumed to account for this uncertainty. .

The soil and ground water around the pump houses is documented as contaminated based on previous investigations involving monitoring wells. Hydrocarbon plumes extend from the tanks in a southeasterly direction. Sampling between the tanks was not possible owing to the risk of penetrating them, however a boring was made generally up-gradient of the tanks (see Contamination Investigation Plan for boring locations). Boring OF03DP16 near building 528 did not encounter contamination based on field and lab analysis. Boring OF03DP17 near building 529 was reported to have an elevated PID reading and fuel odor at approximately 5 feet depth.

Boring OF03DP18 was advanced in the vicinity of the new pump house and hydrocarbons were reported by the lab at 32 milligrams per kilogram (mg/kg) at a depth of approximately 10 feet below the surface. Ground water levels away from the apron appear to be considerably lower, approximately 12 to 13 feet below the surface compared to 6 to 7 feet below the top of pavement under the apron. The reported concentration is below the commonly used action level of 100 parts per million (ppm), thus special disposal methods would not be necessary if these levels are representative of the site as a whole. Hydrocarbons were detected at the sample location; therefore it is prudent to assume that some portion of the excavated soil will be above the mentioned threshold. A modest volume is included in the estimate. The geotechnical report for the project specifies that rubble be over excavated and clean structural fill used as backfill, thus the remaining volume must be disposed of regardless.

Boring OF03DP15, located approximately 200 feet northeast of the pump house site and along the transfer line to the truck fill station, encountered hydrocarbons at 54 mg/kg at a depth of approximately 8 feet. Based on an action level of 100 ppm, this concentration is below the threshold where special disposal methods would be necessary. Rubble fill unsuitable for use as pipe backfill may be encountered however. Because hydrocarbons were detected a modest volume of contaminated soil for disposal is included in the estimate.

3.0 ESTIMATED QUANTITIES OF CONTAMINATED SOIL

3.1 Apron

With a cross-sectional area of 5.33 square yards (48 square feet), and an estimated total length of trench in contaminated areas of 117 yards (350 feet) a total of **620 cubic yards** of contaminated soil is estimated. The majority of this material is anticipated to be reusable as backfill in the trench.

3.2 Pump House UST Removal (option)

The base of the excavation for each set of three tanks will be approximately 45 feet in width and 85 feet in length, with sloped sides to a depth of 15 feet (1-foot below the base of the tanks). The total volume of excavation (clean and contaminated soil) is approximately 3540 cubic yards per pump house. Using the assumptions outlined above, the estimated volume of contaminated soil at each pump house is **750 cubic yards**. This volume of material cannot be reused, however the remaining 2790 cubic yards of clean soil may be returned as backfill.

3.3 Existing Above Ground Storage Tanks

Two tanks of approximately 50 feet in diameter, with an excavation to 5 feet beyond the perimeter and to a depth of 5 feet will produce approximately **1050 cubic yards** of material.

3.4 New Pump House

As stated in the assumptions for the pump house site, reported hydrocarbon levels were below the assumed threshold. In the interest of a conservative estimate, a volume of material equal to five percent of the total excavation is included. The total excavation volume is approximately 1800 cubic yards, therefore **90 cubic yards** of contaminated soil is anticipated.

3.5 Fuel Transfer Lines

Five percent of total volume is anticipated for this area as well. If the fuel line trench is excavated using 1 horizontal to 1 vertical sides to a depth of 9 feet, and a base width of 8 feet is required for the three lines, a total volume of 1333 cubic yards. Therefore **65 cubic yards** of contaminated soils is anticipated.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the data obtained from this and other investigations, the potential for encountering contaminated soil that will require special treatment and/or disposal methods is estimated to be relatively low under the apron portion of the project. Soils at the two existing pump houses where underground storage tanks are present have a very high potential for contamination. Soils at the above ground storage tank locations have a relatively high potential for contamination

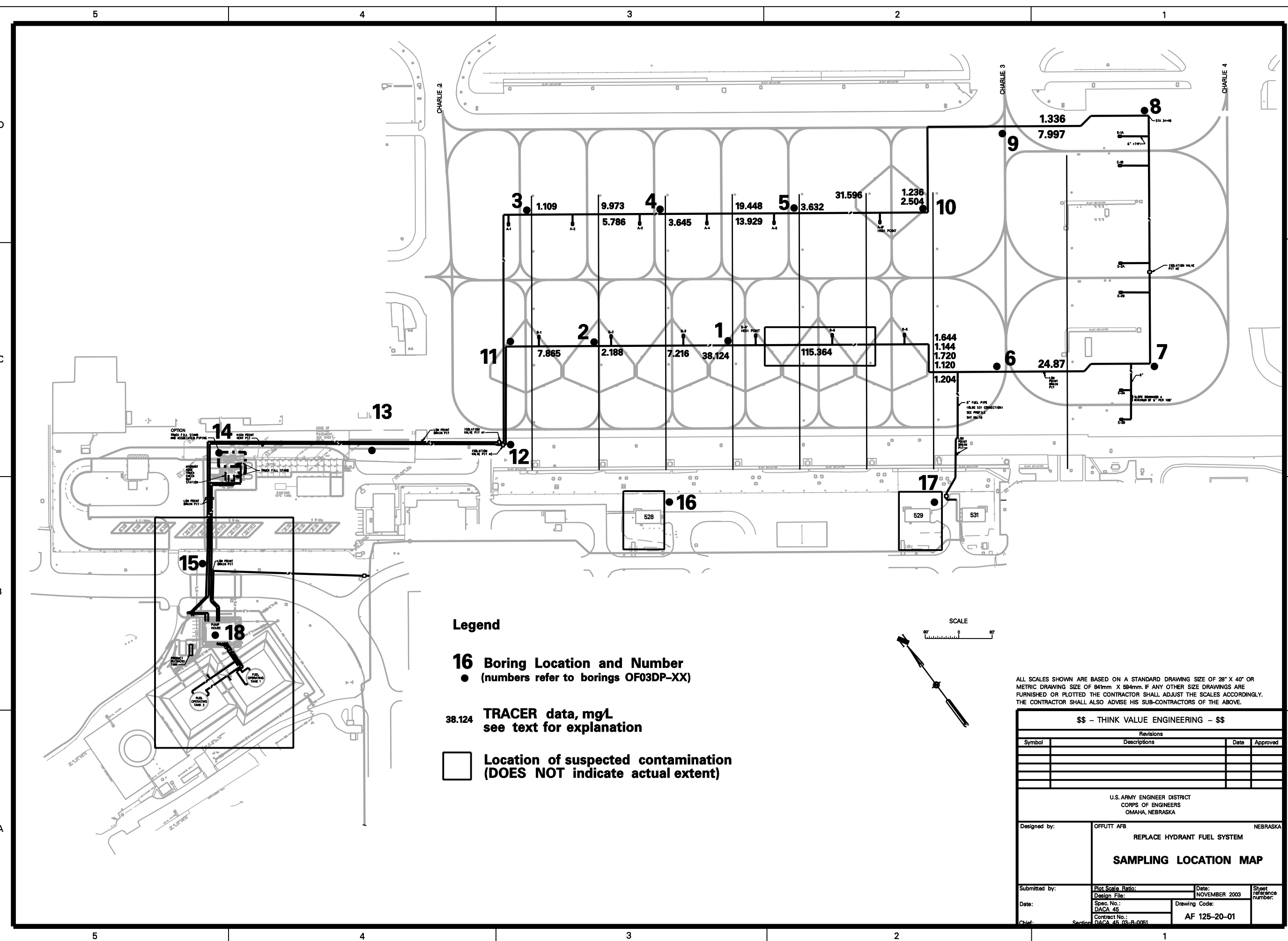
based on previous studies. Soils at the pump house and where fuel transfer lines extend from the pump house to the truck fueling stand have a moderate potential for contamination, however, these areas are anticipated to consist at least in part of rubble that will be unsuitable for use as structural fill.

A total of **3325 cubic yards** of contaminated soil are calculated based on the assumptions outlined above. Of that total, it is anticipated that **620 cubic yards** may be reused as backfill under the apron, yielding **2705 cubic yards** requiring specialized treatment and disposal. It must be borne in mind that the scope of this investigation was limited and only a very small percentage of the total excavation volume for the project was assessed, and that figure represents a best-guess estimate.

Several areas of construction for this project will likely encounter ground water, both contaminated and uncontaminated. Estimating the volume of water that will enter excavations is beyond the scope of this investigation as it involves many variables that are impossible to assess with available data.

Because of the relatively low cost of chemical analysis compared to treatment and disposal, and the limited extent of existing data on the site soils, it is recommended that a comprehensive program of testing be established to verify at the time of excavation that the soils require specialized handling rather than being arbitrarily placed into a specific waste stream. Sampling and screening with a volatile organic vapor detector is one method that may be used to potentially reduce the specialized disposal volume and also ensure that contaminated materials are not improperly disposed of.

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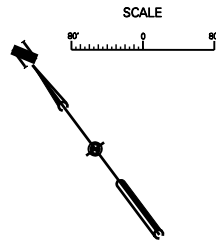


Legend

16 Boring Location and Number
● (numbers refer to borings OF03DP-XX)

38.124 TRACER data, mg/L
see text for explanation

Location of suspected contamination
(DOES NOT indicate actual extent)

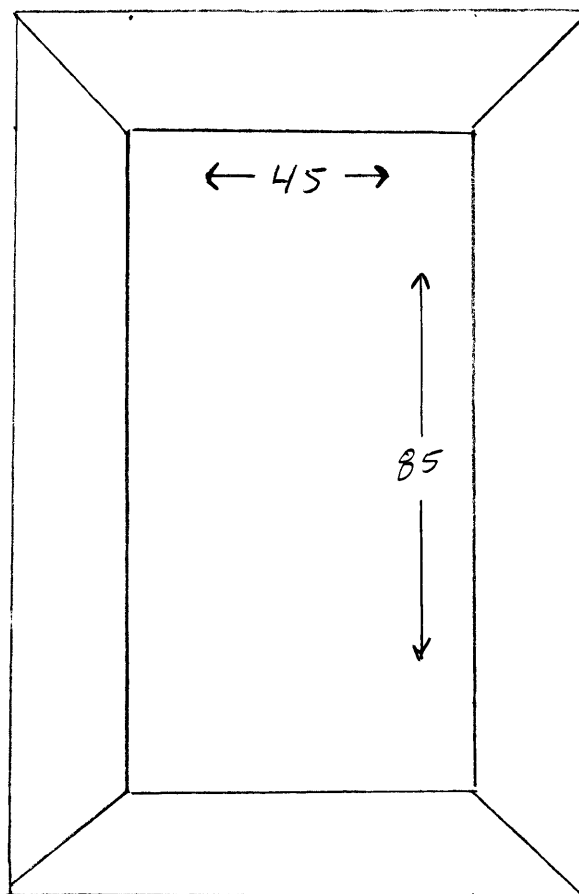
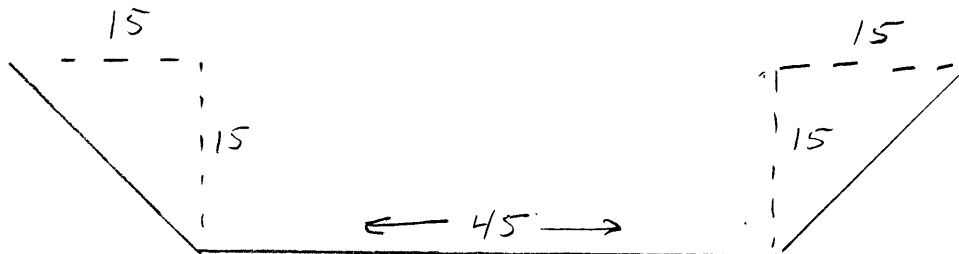


ALL SCALES SHOWN ARE BASED ON A STANDARD DRAWING SIZE OF 28" X 40" OR METRIC DRAWING SIZE OF 841mm X 594mm. IF ANY OTHER SIZE DRAWINGS ARE FURNISHED OR PLOTTED THE CONTRACTOR SHALL ADJUST THE SCALES ACCORDINGLY. THE CONTRACTOR SHALL ALSO ADVISE HIS SUB-CONTRACTORS OF THE ABOVE.

\$\$ - THINK VALUE ENGINEERING - \$\$			
Revisions			
Symbol	Descriptions	Date	Approved
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS OMAHA, NEBRASKA			
Designed by:	OFFUTT AFB	NEBRASKA	
REPLACE HYDRANT FUEL SYSTEM			
SAMPLING LOCATION MAP			
Submitted by:	Plot Scale Ratio:	Date: NOVEMBER 2003	Sheet reference number:
Date:	Design File:	Drawing Code:	
	Spec. No.: DACA 45		
	Contract No.:	AF 125-20-01	
	Section: DACA 45.03-B-0051		

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OMAHA DISTRICT		COMPUTATION SHEET		CORPS OF ENGINEERS	
PROJECT <i>OFFUTT HYDRANT FUELS</i>			SHEET NO. <i>1</i>		OF <i>3</i>
ITEM <i>PUMPHOUSE UST EXCAVATION</i>			BY <i>GGL</i>		DATE <i>10-31-03</i>
<i>VOLUME</i>			CHKD. BY		DATE



OMAHA DISTRICT		COMPUTATION SHEET		CORPS OF ENGINEERS	
PROJECT OFFUTT HYDRANT FUELS			SHEET NO. 2		OF 3
ITEM PUMPHOUSE UST EXCAVATION			BY GGL		DATE 10-31-03
VOLUME			CHKD. BY		DATE

$$\text{VOLUME OF TANKS} = \pi (5.5)^2 (80) = 7600 \text{ ft}^3 \text{ ea.}$$

$$\text{VOLUME OF EXCAVATION} = 45 \times 85 \times 15 = 57,375 \text{ ft}^3$$

(BOTTOM FOOTPRINT TO 15' HEIGHT)

VOLUME OF SLOPED SIDEWALLS =

$$\frac{1}{2} (15') (15') (320') = 36,000 \text{ ft}^3$$

TOTAL EXCAVATION =

$$57,375 + 36,000 - [(6)(7600)] = 47,775 \text{ ft}^3$$

$$= 1,770 \text{ yd}^3$$

PER SIDE

$$\text{TOTAL PER PUMPHOUSE} = 3540 \text{ yd}^3$$

OF WHICH 622 yd³ is Contaminated

PROJECT OFFUT HYDRAANT FUELS

SHEET NO. 3 OF 3

ITEM PUMPHOUSE CONTAMINATED SOIL
EXCAVATION VOLUME

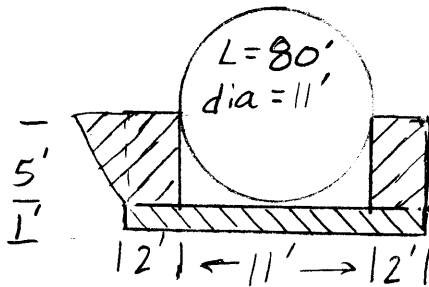
BY GGL

DATE 10-31-03

CHKD. BY

DATE

OUTSIDE TANKS



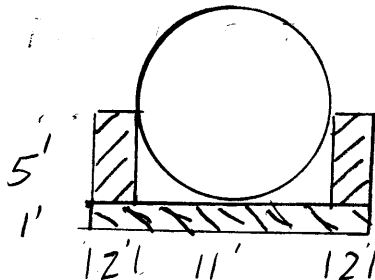
$$\text{Area of trapezoid} + \text{Area of rectangle} = \left[\frac{1}{2}(5)(2.5) \right] + 2[(2)(5)] = 26.25 \text{ ft}^2$$

$$\text{Area of rectangle} = 15' \times 1' = 15 \text{ ft}^2$$

$$\text{SUBTOTAL AREA} = 41.25 \text{ ft}^2$$

$$\text{TWO OUTSIDE TANKS} \therefore \text{TOTAL} = 82.5 \text{ ft}^2$$

INSIDE TANK



$$\text{Area of trapezoid} = 2[(5)(2)] = 20 \text{ ft}^2$$

$$\text{Area of rectangle} = (1)(15) = 15 \text{ ft}^2$$

$$\text{SUBTOTAL AREA} = 35 \text{ ft}^2$$

ONE INSIDE TANK

$$\text{TOTAL AREA} = (82.5) + (35) = 119.5 \text{ ft}^2$$

$$\text{LENGTH OF EXCAVATION} = 85 \text{ FT}$$

$$\therefore \text{VOLUME} = (119.5)(85) = 10,157 \text{ ft}^3 \text{ PER SIDE}$$

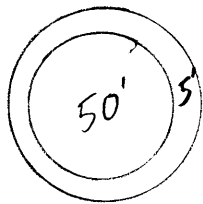
$$\text{TWO SIDES} \therefore \text{PER PUMPHOUSE VOLUME}$$

$$= 2(10,157) = 20,314 \text{ ft}^3$$

$$\approx 750 \text{ yd}^3$$

OMAHA DISTRICT	COMPUTATION SHEET	CORPS OF ENGINEERS	
PROJECT OFFUTT HYDRANT FUELS	SHEET NO. 1	OF 1	
ITEM EXCAVATION VOLUMES AST, PUMPH	BY GGL	DATE 11-1-03	
	CHKD. BY	DATE	

VOLUME OF AST EXCAVATION



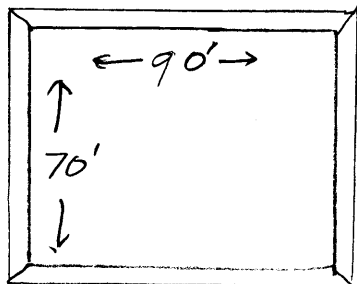
TANK + 5' AROUND PERIMETER

DEPTH = 5' EXCAVATION DIA = 60'

$$VOLUME = \pi(30^2)(5) = 14,137 \text{ ft}^3 \text{ PER tank}$$

$$TOTAL VOLUME = 28,274 \text{ ft}^3 \\ \approx 1050 \text{ yd}^3$$

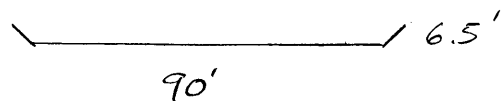
VOLUME OF PUMPHOUSE EXCAVATION



AREA = 70' X 90'

DEPTH = 6.5'

SIDEWALL SLOPE = 1H:1V



$$VOLUME = [(90)(70)(6.5)] + \left[\frac{1}{2} (6.5)(6.5)(346) \right] = 48,260 \text{ ft}^3 \\ \approx 1800 \text{ yd}^3$$

$$5\% = 90 \text{ yd}^3$$

PROJECT OFFUTT HYDRANT FUELS

SHEET NO.

1

OF

1

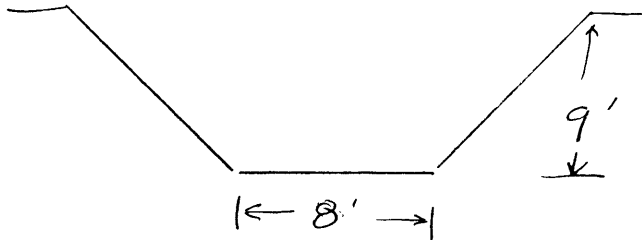
ITEM FUEL TRANSFER LINE TRENCH
EXCAVATION VOLUME

BY GGL

DATE 11-1-03

CHKD. BY

DATE



$$\text{END AREA} = [(8)(9)] + \left[(2) \left(\frac{1}{2} \right) (8)(9) \right] = 144 \text{ ft}^2$$

$$\therefore \text{FOR 250' OF TRENCH VOLUME} = (144)(250) = 36,000 \text{ ft}^3$$

$$= 1333 \text{ yd}^3$$

$$5\% \text{ OF TOTAL} \approx \underline{65 \text{ yd}^3}$$

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APPENDIX B

Chain of Custody Records

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Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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APPENDIX C

Sample Description Logs

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Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page 1 of 1 Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" Split Spoon
Type of Drill Rig Simco 200	Inspector Jennifer Wallers

concrete to 1.55 ft

Sample No.	Date	Headspace Results	Lab*	Sample Description
(4-6') OF03DP01-04	10-17-03	ppm 1.2		Sand(sp) no plastic, med. dense, slightly damp salt and pepper gray, fine-grained bottom 5.5-6.0' damp, finer grained
(6-8') OF03DP01-06	10-17-03	0.0		as above, wet @ 7.5 ft. Sand(sp) no plastic, med. dense, damp to wet (~7.5 ft), salt n pepper gray, fine-grained
(8-10') OF03DP01-08	10-17-03	0.0		as above, <u>heaving</u> . *heaved into rods and barrel during 8-10' run. locked into rods - collapse to 6.7 ft. after rods out.
				Stopped due to heaving sand.

- * Check (✓) box if Encore sample was submitted to lab
no samples for chem.
one jar sample collected @ 8 ft. - 10 ft.
✓ Squeeze up due to weight of concrete?
def. wet 8-10' (note to self)

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page _____ of _____ Pages
Name of Driller. Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 200	Inspector Jon Walker

Concrete 1.5 ft. thick

Sample No.	Date	Headspace Results	Lab*	Sample Description
(4-6') OF03DP02-04	10-17-03	0.1		<u>Sand (SP)</u> no plastic, med. dense, ^{slightly} damp, salt and pepper gray, fine-grained <u>Silty</u>
(6-8') OF03DP02-06	10-17-03	0.0		<u>Sand (SP)</u> no plastic, med. dense, moist, ^{lower (bottom)} dark gray, very fine-grained <u>wet</u> 50 minor clay <u>ft bgs</u>
(8-10') OF03DP02-08	10-17-03	0.0		(as above) but wet throughout. after run, sand squeezed up to 6.5' after rods out, depth 7.5 ft. (wet sand)
				Stop - due to heaving sands

* Check (✓) box if Encore sample was submitted to lab
no chem samples collected due to wet sand.
took 1 jar sample 8-10'.

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page 1 of 1 Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 2000 Earthprobe	Inspector Jen Wolbers

Sample No.	Date	Headspace Results	Lab*	Sample Description
5-7' OF03DP03-05	10-15-03	ppm 0.7		Sand (SP) no plastic, med ^{gw} med. dense, damp, salt n pepper gray, fine-grained (wet ~ 6.5 ft)
10-12' OF03DP03-10	10-15-03	0.0		as above, all wet throughout *prior to run, sand heaved to 6.5 ft.
15-17' OF03DP03-15	10-15-03	0.0		Sand (SP) no plastic, med. dense, wet, red-brown, fine-grained
				*collapse to 5.75 ft after rods out.

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page 1 of 1 Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" Split Spoon
Type of Drill Rig Simco 200 Earthprobe	Inspector Jen Wolbers

	Sample No.	Date	Headspace Results	Lab*	Sample Description
2-4'	0F03DP05-02	10-20-03	ppm 3.1		Sand (sp) no plastic, dense, dry to slightly damp, salt n pepper gray, fine-grained (small gravel 0.2' @ top)
4-6'	0F03DP05-04	10-20-03	0.0		as above
6-8'	0F03DP05-06	10-20-03	0.0		as above @ 6' becomes damp @ 7.5', wet
					heaved to 6.6 ft. - Stopped.
					post pull collapse to 7.2 ft.

* Jar Sample
6-8'

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page <u>1</u> of <u>1</u> Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" Split Spoon
Type of Drill Rig Simco 2000	Inspector Gen Wolbert

concrete to 1.92 ft.

Sample No.	Date	Headspace Results	Lab*	Sample Description
(4-6') OF03DP06-04	10-16-03	0.0		Sand (SP) no plastic, loose to med. dense, damp, red-brown salt and pepper, fine-grained, occ. thin clay lenses
(6-8') OF03DP06-06	10-16-03	0.0		Sand (SP) no plastic, med. dense, wet (@ ~7.0') med. brown / gray, fine-grained
				(stuck) did not attempt

Collapsed
to 6.65
~WL 9

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log

Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page <u>1</u> of <u>1</u> Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 2000	Inspector Jennifer Wolbers

Concrete thickness: 1.27ft

Sample No.	Date	Headspace Results ppm	Lab*	Sample Description
4-6' OF03DP07-04	10-20-03	0.0		Sand (sp) no plastic, med. dense, slightly damp, salt n pepper, fine-grained (silty) (increasing dampness ↓ w/ depth)
8-10' OF03DP07-08	10-20-03	0.0		attempt 8-10' (2 ft. sand in rods) unable to do. 6-8' (as above but wet) →
OF03DP07-	10-20-03			water @ 5.95ft. in rods no attempt - in heaving sand.

* Jar sample 6-8' collapse to 6.6ft after rods out.

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page <u>1</u> of <u>1</u> Pages
Name of Driller. Joe Morrissey	Size and Type of Sampler 1" Split Spoon
Type of Drill Rig Simco 2000 concrete to 1.36 ft.	Inspector Jim Wallace

Sample No.	Date	Headspace Results	Lab*	Sample Description
(4-6') OF03DP08-04	10-16-03	ppm 0.0		Sand (SP) low plastic, med. dense, moist, salt n pepper gray, fine-grained (wet @ bottom ~ 1')
(8-10') OF03DP08-08	10-16-03			lost sample - spoon stuck. unable to retrieve collapse to 6.4 feet bgs (watery sand) WL 6.4
OF03DP08	10-16-03			Stop - grouted hole.

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page 1 of 1 Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 2000	Inspector Jennifer Wolbers

concrete thickness: 1.52 ft.

Sample No.	Date	Headspace Results	Lab*	Sample Description
(2-4') OF03DP09-02	10-20-03	ppm 0.0		Sand (sp) no plastic, dense, dry to slight damp, tan w/ salt n pepper, fine-grained,
(4-6') OF03DP09-04	10-20-03	0.0		as above but damp to moist (bottom very moist) Sand to 5.4 ft.
X OF03DP09	10-20-03			do not attempt - sand up heaving collapse to 5.5 ft. post pull rods

* Jar
sample
4-6'

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE-Omaha	Page 1 of 1 Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 2000	Inspector Jennifer Wolbers

concrete: 1.53 ft. thick

Sample No.	Date	Headspace Results	Lab*	Sample Description
2-4' OF03DP10-02	10-20-03	ppm 0.0		<u>Sand (SD)</u> no plastic, dense, dry to slightly damp, Salt n pepper lt. tan, fine-grained
4-6' OF03DP10-04	10-20-03	0.0		as above, but damp
6-8' OF03DP10-06	10-20-03	0.0		as above, but wet @ -6.9 ft. slightly coarser-grained collapse to 7.05 ft. post-pull

* Jar
Sample
6-8'

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page _____ of _____ Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 200A	Inspector Jen Wolbers

concrete thickness: 1.52 ft.

Sample No.	Date	Headspace Results	Lab*	Sample Description
(4-6') OF03DP11-04	10-21-03	0.0		<u>Sand (sp)</u> no plastic, med. dense, damp to very damp (@ ~5.8'), lt. brown, fine-grained
(6-8') OF03DP11-06	10-21-03	0.0		<u>Silty Sand (sp)</u> no plastic, med. dense, moist, lt. gray, fine to very fine-grained @ 7.7', sandy clay (cc), med. plastic, med. stiff, damp, lt. gray (too small for sample)
(8-10') OF03DP11-08	10-21-03	0.0		<u>Silty Sand (sp)</u> no plastic, dense, wet, lt. - med. gray, very fine-grained (pushed up to 7.4') water 7.2 ft. in rods collapse post-pull to 6.3 ft bgs.

* Check (✓) box if Encore sample was submitted to lab

* took jar sample 8-10 ft.

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE- Omaha	Page _____ of _____ Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" Split Spoon
Type of Drill Rig Simco 2000	Inspector Jennifer Wolbers

Sample No.	Date	Headspace Results	Lab*	Sample Description
4-6' OF03DP12-04	10-21-03	0.0		<u>Sand (SP)</u> no plastic, med. dense, dry to slightly damp, tan salt n pepper, fine-grained (finer from 5.4 to 6.0')
6-8' OF03DP12-06	10-21-03	0.0		<u>Clay (CL)</u> 6-7 ft. med. plastic, soft to med. dense, damp, med. gray, some fine sand/silt <u>Sand (SP)</u> 7-8 ft. no plastic, med. dense, damp, med. brown, fine
8-10' OF03DP12-08	10-21-03	0.0	8.5, 9.5 X	as above to 8.5 ft. <u>Clay (CL)</u> 8.5-9.5 ft. med. plastic, med. stiff, damp, med. gray <u>Siltu Sand (SO)</u> low plastic, med. dense, wet, light brown fine sand post-pull collapse to 9.2 ft.

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log Hydrant Fuel System Contamination Investigation Offutt AFB, NE

Drilling Agency USACE - Omaha	Page 1	of 1	Pages 1
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon		
Type of Drill Rig Simco 2000	Inspector Ken Wolbers		

on grass

0-3 3' 2'
clay → dry sand

Sample No.	Date	Headspace Results	Lab*	Sample Description
(4-6) OF03DP13-04	10-17-03	ppm 0.0		Sand (sp) no plastic, med. dense, slight damp, H. tan salt n pepper, fine-grained
(8-10) OF03DP13-08	10-17-03	0.0		as above but moist w/ acc. thin clay lenses
(12-14) OF03DP13-12	10-17-03	0.0		as above but wet w/ finer grain size (silty)

**collapse
13.65'
post-pull
rods**

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE-Omaha	Page <u>1</u> of <u>1</u> Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" splitspoon
Type of Drill Rig Simco 200	Inspector Jen Wolbers

no concrete asphalt here-on grass

Sample No.	Date	Headspace Results	Lab*	Sample Description	
(4-6') OFD3DP15- *04	10-16-03	0.0 ppm		<u>Sand (SP)</u> no plastic, loose to med. dense, damp, red-brown, fine-grained (upper 0.4ft. has minor clay)	
(8-10') OFD3DP15- *08	10-16-03	0.0 ppm	✓	*Clay (CL) @ 0.6 ft. (took sample here) med. plastic, stiff, damp, dark brown <u>Clayey Sand (SC)</u> low plastic, med. dense, olive gray, very moist to wet, fine-grained (wet @ very bottom)	8.6'
(14-16') OFD3DP15- *14	10-16-03	0.0 ppm		<u>Sand (SP)</u> low plastic, med. dense, wet, olive gray, fine-grained, minor clay	~10ft.
					collapse to 13.7 ft.
					13.7 post-pull

* Check (✓) box if Encore sample was submitted to lab

* adjusted sample depths based on water levels @ hole 18 (@ ~12 ft.)
instead of 5 to 7', took 4' to 6'
" " 10 to 12' took 8' to 10'
15 to 17' => 14 to 16'

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page <u>1</u> of <u>1</u> Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" Split spoon
Type of Drill Rig Simco 2000	Inspector Jen Wolbers

concrete parking lot by Fuels → 0.75 ft. concrete (rest broken up)

Sample No.	Date	Headspace Results ppm	Lab*	Sample Description
(4-6) OF03DPI4-04	10-17-03	0.0		Clay (CL) med. plastic, med. stiff, slightly damp, med. gray, with fine sand / silt.
(8-10) OF03DPI4-08	10-17-03	0.0	✓	Clay (CL) med high plastic, med. stiff, damp, dk. gray
(12-14) OF03DPI4-12	10-17-03	0.0		top 0.5 ^{more} clay Sand (SP) low plastic, med. dense, wet, med. brown, fine-grained Wet @ 12.5 ft.

WL-13.5?
collapse
to 13.7 post
pull rods

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page 1 of 1 Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" Split Spoon
Type of Drill Rig Simco 2000 (on grass)	Inspector Jen Wolbers

Sample No.	Date	Headspace Results	Lab*	Sample Description
4-6	10-21-03	0.0		Clayey Sand (SC) low plastic, med. dense, slightly damp, lt. tan / red-gray, very fine to fine-grained sand
8-10	10-21-03	0.0	✓	Clay (CL) med. plastic, med. stiff, med. gray, some fine sand, damp (8-9.6')
wet 13'				Sand (SP) , low plastic, med. dense, moist, lt. brn. v. fine-grain w/ clay
12-14'	10-21-03	0.0		as above to 13.0'
				Sand (sp) no plastic, med. dense, wet, lt. brown, fine-grained w/ fines (silty)
				collapse to 13.1 ft. after rods out.

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE- Omaha	Page 1 of 1 Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 200	Inspector Jen Wolbers

(gravel area)

Sample No.	Date	Headspace Results	Lab*	Sample Description
(4-6') OF03DP17-04	10-21-03	1872 1000 ppm		Clay (cl). med. plastic, med. stiff, damp, med. gray (no obvious odor)
(8-10') OF03DP17-08	10-21-03	4.4	✓	(1.2'-1.8' Sand = strong odor) = 5.2 to 5.8' * bgs (see below) Clay (cl) med. plastic, med. stiff, damp, med. gray (no obvious odor)
(12-14') OF03DP17-12	10-21-03	0.0		Silty Sand (sp) low plastic, med. dense, wet, lt. brown, very fine-grained, some clay.
				Collapse to 13.6 ft. after rods out.
				* Sand 5.2 to 5.8', no plastic, med. dense, moist, salt n pepper, fine-grained, strong petrol odor

* Check (✓) box if Encore sample was submitted to lab

Sample Description Log
Hydrant Fuel System Contamination Investigation
Offutt AFB, NE

Drilling Agency USACE - Omaha	Page _____ of _____ Pages
Name of Driller Joe Morrissey	Size and Type of Sampler 1" split spoon
Type of Drill Rig Simco 200	Inspector Gen Walburn

(0.2' asphalt)

Sample No.	Date	Headspace Results	Lab*	Sample Description
(5-7') OF03DP18-05	10-16-03	0.9 ppm		<u>Clay (cl)</u> low plastic, med. stiff, dark gray-brown, slightly damp, occ. fine sand, some roots, acc. lg. gravel
(10-12') OF03DP18-10	10-16-03	0.0 ppm	✓	<u>Sandy Clay (cl)</u> low-med. plastic, soft, very moist to wet, olive gray, fine-grained sand (samples ^g) wet ~ 11.7 ft.
(15-17') OF03DP18-15	10-16-03	0.0		<u>Sand (sp)</u> no plastic, loose to med. dense, wet, med-brown, very fine to fine-grained sand

little water on mod @ 9.8 ft (Sandy zone ~ 3" thick)

Collapsed to 13.0 ft. water @ 12.9 ft.

* Check (✓) box if Encore sample was submitted to lab

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APPENDIX D

Chemical Quality Assurance Report

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Appendix D: Chemical Quality Assurance Report

Soil Analytical Results
Offutt AFB
Replace Hydrant Fuel System Pre-design

Sample ID	Result TPH/DRO mg/kg	Results VOC/GRO
OF03DP12-08	<10	VOCs ND GRO < 100 ug/kg
OF03DP14-08	<10	Acetone 14J ug/kg GRO < 100 ug/kg
OF03DP15-08	54*	Acetone 14J ug/kg GRO < 100 ug/kg
OF03DP16-08	<10	VOCs ND GRO < 100 ug/kg
OF03DP17-08	<10	Benzene 3.2 J ug/kg Ethylbenzene ND Meta/para-xylenes ND GRO < 100 ug/kg
OF03DP18-10	32*	Acetone 16J GRO < 100 ug/kg

* C16-C25 light lubricating oil

ND = Non-detect

TPH = Total Petroleum Hydrocarbons

DRO = Diesel Range Organics

GRO = Gasoline Range Organics

VOC = Volatile Organic Compounds

mg/kg = milligram per kilogram

ug/kg = microgram per kilogram

J = Estimated value between the Method Detection Limit and the Reporting Limit

Discussion of Results: OF03DP15-08 and OF03DP18-10 had detections of TPH/DRO. The action level for soil that is considered clean for this project is 100 mg/kg TPH. Therefore none of the samples were above the clean-up standard. Acetone was detected in several samples at trace levels, but this is mostly likely a laboratory or sampling artifact. Gasoline Range Organics Petroleum Hydrocarbons were not found in any sample. A trace of benzene 3.2J was found in OF03DP17-08. Benzene is a compound found in fuels. None of the samples should be considered contaminated with Volatile Organics for purposes of this investigation.

Chemical Quality Assurance: When the Quality Control results have been received from the laboratory these shall be discussed.

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of Engineers** ®

Omaha District